

GENERATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a generator, and more particularly to a generator that will generate electricity when the generator is pressed.

2. Description of Related Art

To improve attractiveness of an object, such as a shoe, an illumination or an audio device is mounted on or in the object, and an illuminated or audible warning is also provided in a dark environment. A conventional way to provide electricity to the illumination or audio device is to mount batteries in the object. The battery has a limited useful life, so the battery must be replaced with a new one when the battery dies. However, batteries mounted inside a solid object are difficult or impossible to replace.

To overcome the shortcomings, the present invention provides a generator to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

The main objective of the invention is to provide a generator that can generate electricity when the generator is pressed. The generator has a base, a stator, a rotor base, a rotor, a drive shaft, a biasing member and a top cover. The stator is annular and is mounted on the base. The rotor base is rotatably mounted on the base and is mounted inside the stator. The rotor base has a central hole with an inner surface defined through the rotor base and at least one key formed on the inner surface of the central hole. The rotor is mounted around the rotor base and has a gap defined between the rotor and the stator. The drive shaft is

1 slidably mounted in the central hole in the rotor base and has at least one spiral
2 groove in which the at least one key on the rotor base is mounted. The biasing
3 member is mounted between the base and the drive shaft to provide a restitution
4 force to the drive shaft. The top cover is mounted on the base to cover the stator,
5 rotor base, the rotor, the drive shaft and the biasing member. The top cover has a
6 central bore through which the top of the drive shaft non-rotatably extends.

7 Other objects, advantages and novel features of the invention will
8 become more apparent from the following detailed description when taken in
9 conjunction with the accompanying drawings.

10 BRIEF DESCRIPTION OF THE DRAWINGS

11 Fig. 1 is an exploded perspective view of a generator in accordance with
12 the present invention;

13 Fig. 2 is a cross sectional side plan view of a heel of a shoe with the
14 generator in Fig. 1;

15 Fig. 3 is an operational cross sectional side plan view of the shoe in Fig.
16 2 with the drive shaft of the generator in Fig. 1 pressed down;

17 Fig. 4 is a top plan view of a floor mat with two generators in accordance
18 with the present invention; and

19 Fig. 5 is a side plan view in partial section of the floor mat in Fig. 4;

20 DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

21 With reference to Fig. 1, a generator (10) in accordance with the present
22 invention comprises a base (11), a stator (13), a rotor base (15), a rotor (14), a
23 drive shaft (16), a biasing member (18) and a top cover (12). With further
24 reference to Figs. 2 and 4, the base (11) is mounted securely in an object, such as

1 a shoe or a floor mat.

2 The stator (13) is annular and is mounted on the base (11). An
3 illumination or audio device is mounted in the object in which the generator (10)
4 is mounted and is connected electrically to the generator in a conventional
5 manner.

6 The rotor base (15) is rotatably mounted on the base (11) and in the
7 stator (13). The rotor base (15) has a central hole (152) with an inner surface
8 defined through the rotor base (15) and at least one key (154) formed on the inner
9 surface of the central hole (152).

10 The rotor (14) is mounted around the rotor base (15) and has a gap (not
11 numbered) defined between the rotor (14) and the stator (13).

12 The drive shaft (16) is slidably mounted in the central hole (152) in the
13 rotor base (15) and has a top (not numbered), a bottom (not numbered), an outer
14 surface (not numbered) and at least one spiral groove (164). The at least one
15 spiral groove (164) is defined in the outer surface and extends from the bottom of
16 the drive shaft (16). The at least one key (154) on the rotor base (15) is slidably
17 mounted in the at least one spiral groove (164).

18 The biasing member (18) is mounted between the base (11) and the drive
19 shaft (16) to provide a restitution force to the drive shaft (16) when the drive
20 shaft (16) is pushed down. With further reference to Fig. 2, the biasing member
21 (18) in an optional embodiment is a spring and may be any resilient material. The
22 base (11) optionally has an axial rod (112) extending upward from the base (11).
23 The biasing member (18) is mounted around the axial rod (112) and has two ends
24 abutting respectively the base (11) and the bottom of the drive shaft (16). The

1 drive shaft (16) has a hole (not numbered) defined in the bottom to receive the
2 axial rod (112) when the drive shaft (16) is pressed downward.

3 The top cover (12) is mounted on the base (11) to cover the stator (13),
4 the rotor base (15), the rotor (14), the drive shaft (16) and the biasing member
5 (18). The top cover (12) has a central bore (122) through which the top of the
6 drive shaft (16) non-rotatably extends. In an optional embodiment, the central
7 bore (122) has an inner surface and at least one keyway (124), and the drive shaft
8 (16) has a corresponding number of ribs (162). The at least one keyway (124) is
9 defined in the inner surface of the central bore (122). The at least one rib (162) is
10 formed on the outer surface of the drive shaft (16) and is slidably mounted
11 respectively in the at least one keyway (124) in the central bore (122) of the top
12 cover (12). The engagement of the keyways (124) and the ribs (162) keeps the
13 drive shaft (16) from rotating relative to the top cover (12). In an alternative
14 embodiment, the central bore (122) in the top cover (12) is non-circular, and the
15 top of the drive shaft (16) is a corresponding non-circular cylinder. The non-
16 circular engagement between the central bore (122) and the drive shaft (16)
17 keeps the drive shaft (16) from rotating relative to the top cover (12) but allows
18 the drive shaft (16) to slide in and out of the central bore (122).

19 With reference to Figs. 1 to 3, the generator (10) can be mounted in a
20 sole of a shoe. In this application, a button (17) is mounted on the top of the drive
21 shaft (16) and partially extends into the shoe. When a person wearing the shoe
22 with the generator (10) steps on the ground, the person's foot will press and
23 move the button (17) and the drive shaft (16) downward. Because the drive shaft
24 (16) non-rotatably extends through the top cover (12), the rotor base (15) with

1 the rotor (14) will be rotated due to the engagement between the at least one key
2 (154) and the at least one groove (164) when the drive shaft (16) moves
3 downward. Accordingly, electrical current will be generated in the coil in stator
4 (13) when the rotor (14) with the permanent magnet rotates relative to the stator
5 (13) and will operate the illumination device or the audio device connected to the
6 coil.

7 When the person's heel lifts off the ground, the force pressing the button
8 (17) will be released, and the restitution force in the biasing member (18) will
9 push the drive shaft (16) upward. The upward movement of the drive shaft (16)
10 and the engagement between the key (154) on the rotor base (15) and the groove
11 (164) in the drive shaft (16) causes the rotor (14) to rotate in the reverse direction
12 and generate electrical current.. The illumination device or the audio device can
13 operate with the electricity provided by the generator (10) to provide a
14 decorative effect and an audible warning while a person is walking.

15 With reference to Figs. 4 and 5, another application of the generator (10')
16 in accordance with the present invention mounts the generator (10') in a floor
17 mat (30). The floor mat (30) comprises a base (not numbered), multiple springs
18 (not numbered) and a top (not numbered). The springs are mounted in the base
19 and support the top that is moveably mounted on the base. Two or more
20 generators (10') are mounted in the base of the floor mat (30) and are electrically
21 connected respectively to illumination devices (not numbered). The top of the
22 drive shaft of each generator (10') abuts the top of the floor mat (30). When
23 someone steps onto the floor mat (30), the drive shaft will be pressed by the top
24 of the floor mat (30), which will generate electricity to light the illumination

1 devices.

2 Even though numerous characteristics and advantages of the present
3 invention have been set forth in the foregoing description, together with details
4 of the structure and function of the invention, the disclosure is illustrative only,
5 and changes may be made in detail, especially in matters of shape, size, and
6 arrangement of parts within the principles of the invention to the full extent
7 indicated by the broad general meaning of the terms in which the appended
8 claims are expressed.